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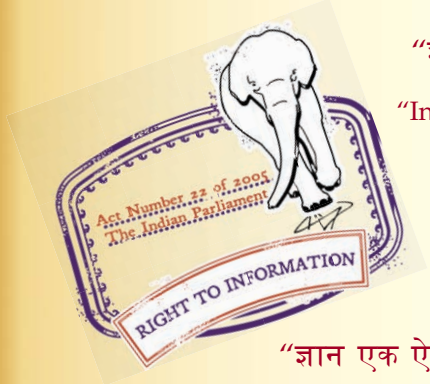
IS 10387 (1990): Semi-Reinforcing Furnace [SRF-LM-NS (N-762) AND SRF-HM-NS (N-774)] Carbon Black [PCD 13: Rubber and Rubber Products]



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"Knowledge is such a treasure which cannot be stolen"

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IS 10387 : 1990
(Reaffirmed 2012)

Indian Standard

SEMI-REINFORCING FURNACE [SRF-LM-NS (N-762) AND SRF-HM-NS (N-774)] CARBON BLACK — SPECIFICATION

(First Revision)

भारतीय मानक

अर्ध प्रबलित भट्टी [एस आर एफ-एलएम-एन एस (एन-762) और एस आर एफ-एच एम-एन एस (एन-774)] काला कार्बन — विशिष्टि

(पहला पुनरीक्षण)

UDC 661·666·4 : 678·4·046·2

BUREAU OF INDIAN STANDARDS
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

June 1990

Price Group 2

FOREWORD

This Indian Standard (First Revision) was adopted by the Bureau of Indian Standards on 10 January 1990, after the draft finalized by the Rubber Products Sectional Committee had been approved by the Petroleum, Coal and Related Products Division Council.

Carbon blacks are added to rubbers to develop physical strength properties and are, therefore, commonly known as reinforcing agents.

This standard covers the requirements for two grades of semi-reinforcing furnace carbon black namely, SRF-LM-NS and SRF-HM-NS used by the rubber industry which have been given the nomenclature N-762 and N-774 respectively by the American Society for Testing Materials. This standard was first published in 1982. In this revision, Industry Reference Black (IRB) No. 6 has been included as reference black instead of IRB No. 4 for measuring physical properties of the vulcanizate. Also, the requirement for loss on heating has been modified and requirement for staining tendency has been deleted.

This standard contains clauses **5.2** and **5.4** which call for agreement between the purchaser and the supplier.

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS 2 : 1960 'Rules for rounding off numerical values (*revised*)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

Indian Standard

SEMI-REINFORCING FURNACE [SRF-LM-NS (N-762) AND SRF-HM-NS (N-774)] CARBON BLACK — SPECIFICATION

(First Revision)

1 SCOPE

1.1 This standard prescribes the requirements and methods of sampling and test for semi-reinforcing furnace (SRF-LM-NS (N-762) and SRF-HM-NS (N-774)] carbon black for use in rubber industry.

2 REFERENCES

2.1 The Indian Standards given in Annex A are necessary adjuncts to this standard.

3 TERMINOLOGY

3.1 For the purpose of this standard, definitions given in IS 7503 (Parts 1 to 4) shall apply.

4 GRADES

4.1 Two grades of semi-reinforcing furnace carbon black have been covered by this specification which have been designated as follows:

a) SRF-LM-NS (N-762), low modulus semi-reinforcing furnace carbon black, non-staining; and

b) SRF-HM-NS (N-774), high modulus semi-reinforcing furnace carban black, non-staining.

5 REQUIREMENTS

5.1 The material shall be free from foreign matter like wood, metal and fibres.

5.2 Pelletization

The material shall be delivered in the pelletized form. Pellet hardness shall be controlled to such a degree that satisfactory dispersion is obtained when compounded in standard mixing equipment as desired by the purchaser.

5.3 The material shall also comply with the requirements given in Table 1.

5.4 Compounding

If desired by the purchaser the material may be compounded in natural rubber test recipe following the procedure given in Annex B and the properties carbon black assessed relative to IRB No. 6.

6 PACKING AND MARKING

6.1 Packing

The material shall be supplied in bags. The net mass of each bag shall be 25 ± 0·5 kg. The bags shall be shaped to facilitate stacking in pellets by slight.

Table 1 Requirements for Semi-Reinforcing Furnace [SRF-LM-NS (N-762) and SRF-HM-NS (N-774)] Carbon Black

(*Clause* 5.3)

Sl No.	Characteristic	Requirement		Method of Test, Reference to Clause No. in IS 7498 : 1985
		SRF-LM	SRF-HM	
(1)	(2)	(3)	(4)	(5)
i)	Iodine adsorption, as mg of iodine, carbon black	23 to 31	24 to 34	5
ii)	Dibutyl phthalate absorption	58 to 66	66 to 76	6
iii)	Pour density, g/l	470 to 530	432 to 502	7
iv)	Sieve residue, percent by mass, *Max*			
	a) Through 45-micron IS Sieve	0·100 0	0·100 0	—
	b) Through 500-micron IS Sieve	0·001 0	0·001 0	—
v)	Loss on heating, percent by mass, *Max*	1·0	1·0	9
vi)	Ash content, percent by mass, *Max*	0·50	0·50	10
vii)	Fines content, percent by mass, *Max*	15·0	15·0	13
viii)	Toluene discolouration, percent	65	65	16

6.2 Marking

The packages shall be marked with indication of source of manufacture, net mass, month and year of manufacture, batch number, grade identification and shall have red colour as colour code identification.

7 SAMPLING, NUMBER OF TESTS AND CRITERIA FOR CONFORMITY

7.1 Sampling

The sampling of carbon black shall be done in accordance with IS 7498 : 1985.

7.2 Number of Tests and Criteria for Conformity

All the characteristics of SRF carbon black given in Table 1 shall be tested on individual samples. The lot shall be declared as conforming to the requirements of the specification if all the test results of each of the individual samples satisfy the corresponding requirements.

ANNEX A

(*Clause* 2.1)

LIST OF REFERRED INDIAN STANDARDS

IS No.	*Title*
IS 1675 : 1971	Stearic acid, technical (*first revision*)
IS 3399 : 1973	Zinc oxide for rubber industry (*first revision*)
IS 3400 Part 1 : 1987	Methods of test for vulcanized rubbers : Part 1 Tensile stress-strain properties (*second revision*)
IS 4588 : 1986	Rubber, raw natural (*third revision*)
IS 7498 : 1985	Methods of sampling and test for carbon black (*first revision*)
IS 7503	Glossary of terms used in rubber industry:
Part 1 : 1988	Basic terms
Part 2 : 1988	Definitions of additives (*first revision*)
Part 3 : 1988	Definitions relating to properties and testing (*first revision*)
Part 4 : 1988	Definitions relating to processing (*first revision*)
IS 8483 : 1989	Dibenzothiazyl disulphide
IS 8851 : 1978	Sulphur for rubber industry

ANNEX B

(*Clause* 5.4)

SCHEDULE FOR COMPOUNDING AND TESTING FOR PHYSICAL EVALUATION OF CARBON BLACK

B-1 GENERAL

B-1.1 These procedures involve the incorporation of the black to be tested in rubber along with the necessary auxiliary agents, to permit vulcanization, followed by testing. Along with each test black, a corresponding stock containing the Industry Reference Black No. 6, is included. The differences between the properties obtained on the reference black is simply a device to cancel the inevitable variations in test results which are due to minor variations between laboratories in equipment, materials, procedures and ambient conditions.

B-2 STANDARD NATURAL RUBBER COMPOUNDING FORMULATION

B-2.1 The standard formulation for testing carbon black is given below:

Material	*Parts by Mass*
Natural rubber grade ISNR : 5 (*see* IS 4588 : 1986)	100
Zinc oxide (*see* IS 3399 : 1973)	5
Stearic acid (*see* IS 1675 : 1971)	3·0
Dibenzothiazyl disulphide (*see* IS 8483 : 1976)	0·6
Sulphur (*see* IS 8851 : 1978)	2·5
Carbon black (SRF)	50

B-3 MIXING METHOD

B-3.1 The mixing method is given in **B-3.1.1** to **B-3.1.10**.

B-3.1.1 Use a two roll laboratory mill having 150 mm outside diameter and 250 to 280 mm working distance between the guides. The speed of slow roll should be 24 ± 0·5 rev/min and the friction ratio should be 1 to 1·4. Adjust and maintain roll temperature at 70 ± 5°C and set mill opening at 1·4 mm.

B-3.1.2 The carbon black shall be conditioned before weighing, by heating in an oven at 100 to 110°C for 1 hour.

B-3.1.3 Weigh the ingredients for a batch size which is 4 times of the parts by mass in g given in **B-2.1**.

B-3.1.4 Add rubber and band on mill, make two 3/4th cut from each side (time 2·0 minutes).

B-3.1.5 Set mill opening at 1·65 mm and add stearic acid and make 3/4th cut once each way (time 2·5 minutes).

B-3.1.6 Add sulphur, accelerator, zinc oxide and make 3/4th cut twice each way (time 2 minutes).

B-3.1.7 Add carbon black. Open mill gradually to maintain constant bank. 3/4th cut three times each way after all carbon black is in (time 7·5 minutes).

B-3.1.8 Cut stock, roll and weigh. If the mass is beyond the tolerance of ±0·6 percent, reject the batch (time 1 minute).

B-3.1.9 Pass end wise six times at 0·8 mm opening, and sheet off at 2·2 mm finished gauge (time 2·5 minutes).

B-3.1.10 Condition the stock for 1 to 24 hours at temperature of 27 ± 2°C and cut out suitable slabs for vulcanization.

B-4 VULCANIZATION

B-4.1 The test pieces are vulcanized for 15 and 30 minutes at 145°C in a standard 4-cavity mould which gives sheets of dimensions 150 × 150 × 2 mm. The curing press shall be capable of exerting a minimum pressure of 3·5 MN/m² (approx 35 kgf/cm²) on the cavity areas of the mould during vulcanization. After vulcanization the sheets shall be cooled immediately in water. Condition the vulcanized test slab for 16 hours to 72 hours at 27 ± 2°C before testing.

B-5 TESTING

B-5.1 The vulcanized sheets are tested for 300 percent modulus, and tensile strength in accordance with IS 3400 (Part 1) : 1987.

B-6 PHYSICAL PROPERTIES

B-6.1 The difference in physical properties of vulcanizates containing SRF carbon black as compared to IRB No. 6 shall be as given in Table 2.

Table 2 Difference in Physical Properties of Vulcanizates Containing SRF Carbon Black from IRB No. 6

(*Clause* B-6.1)

Sl No.	Grade	Cure Conditions	Tensile Strength *Min* MPa*	300 Percent Modulus MPa*
(1)	(2)	(3)	(4)	(5)
i)	SRF-LM	15 minutes at 145°C	−4·95	−4·00 to −1·00
		30 minutes at 145°C	−4·72	−4·10 to +1·10
ii)	SRF-HM	15 minutes at 145°C	−4·0	−3·00 to −0·00
		30 minutes at 145°C	−3·57	−2·90 to +0·10

*1 MPa = approx 10·2 kgf/cm².

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The use of the Standard Mark is governed by the provisions of the *Bureau of Indian Standards Act, 1986* and the Rules and Regulations made thereunder. The Standard Mark on products covered by an Indian Standard conveys the assurance that they have been produced to comply with the requirements of that standard under a well defined system of inspection, testing and quality control which is devised and supervised by BIS and operated by the producer. Standard marked products are also continuously checked by BIS for conformity to that standard as a further safeguard. Details of conditions under which a licence for the use of the Standard Mark may be granted to manufacturers or producers may be obtained from the Bureau of Indian Standards.

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TO
IS 10387 : 1990 SEMI-REINFORCING FURNACE [SRF-LM-NS(N-762) AND SRF-HM-NS (N-774)] CARBON BLACK — SPECIFICATION

(First Revision)

(*Page* 1, *clause* **5.4**, *line* 4) — Substitute 'IRB No. 7.' *for* 'IRB No. 6.'

[*Page* 1, *Table* 1, *Sl No.*(i), *col* 2] — Substitute 'Iodine Adsorption, as mg of Iodine/g of Carbon Black (ml/100 g of Carbon Black)' *for* ' Iodine adsorption, as mg of iodine, carbon black'.

[*Page* 1, *Table* 1, *Sl No.* (ii)] — Substitute 'Di butyl phthalate absorption ml/100g' *for* 'Dibutyl phthalate absorption'.

(*Page* 2, *clause* **B-1.1**, *line* 6) — Substitute 'IRB No. 7' *for* 'Industry Reference Black No. 6'.

(*Page* 3, *clause* **B-4.1**, *line* 1) — Substitute '30 minutes' *for* '15 and 30 minutes'.

(*Page* 3, *clause* **B-6.1**, *line* 3) —Substitute 'IRB No. 7' *for* 'IRB No. 6'.

(*Page* 3, *Table* 2) — Substitute the following for the existing:

Table 2 Difference in Physical Properties of Vulcanisates Containing SRF Carbon Black from IRB No. 7

Sl No.	Grade	Cure Conditions	Tensile Strength, *Min*, MPa*	300 Percent Modulus MPa*
(1)	(2)	(3)	(4)	(5)
i)	SRF-LM	30 min at 145 oC	-6.23	-7.25 to - 2.05
ii)	SRF-HM	30 min at 145 oC	-5.08	-6.05 to -3.05

*1 MPa = approximately 10.2 kgf/cm2.

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